REMARKS

The rejections under 35 USC 112, second paragraph, are traversed by editing of the claims that, like some other editing of the claims except for the addition of the means for adjusting the temperature of the liquid added to claim 1, is non-narrowing so as not to invoke any Festo-like limitations.

The rejections of claim 1 and, thus, the other claims under 35 USC 102 for anticipation by the cited Connor, O'Neill, Abthoff, et al. and Mesurier patents are traversed by the original limitations with the addition of means for adjusting a temperature of the aqueous liquid for the spraying of the mist into the air intake duct. None of the patents disclose or suggest the temperature adjustment now claimed.

The latter addition is supported by, for example, page 15, lines 27-29, of the specification and original claim 17. New independent claim 18 corresponds to claim 1 with similar addition, whereby to similarly traverse the rejections.

The solution of the invention has numerous significant advantages. In the apparatus of the invention, the above-described undesirable effects and deficiencies are eliminated by using also at its temperature adjustable water spraying, which is distributed to one or more points in the air intake duct by varying the number and/or size and/or quality of the nozzles used, depending on the load and temperature of the engine. According to the invention, the water flux is distributed to a number of small nozzles to make it possible to produce sufficiently small droplets and/or to distribute such droplets over a larger are in the air intake duct so as to achieve an optimal vaporization.

In the system of the invention, the spraying can also be focused on optimal points in the air intake ductwork where the temperature and/or air flow is highest. In the system of the

invention, the number of nozzles spraying, the point and/or direction of injection of the spray in the air intake ductwork can be varied according to the amount of water needed, e.g. on the basis of the load and/or speed of rotation of the engine. In the system of the invention, it is further possible to maintain a high nozzle pressure so as to keep the droplet size of the mist being sprayed sufficiently small. Furthermore, the system allows the spraying to be varied between nozzles having different properties. The system of the invention produces an optimal droplet size of the liquid injected into the intake air. By using a nozzle cleaning system as part of the water spraying system, very reliable operation of the system is achieved because the possibility of nozzles being clogged is avoided. By using pop-up nozzles as part of the system, the risk of the nozzles being clogged is further reduced. On the other hand, by using pop-up nozzles, the nozzles are no impediment to the flow in the air intake duct when the system is out of use. For example by using throttle elements in return channels, it is possible automatically adjust the temperature of the liquid at a higher level especially on low loads of the engine.

As the apparatus is connected directly to the structures of the air intake duct and it produces a fine mist directly without using any extra chambers or other containers, it is able to make full use of the heat quantity required for the vaporization of the water, cooling the intake air at each spray injection point to a temperature close to the wet bulb temperature (or adiabatic saturation temperature, which in the case of a water-air mixture is practically the same thing), i.e. to the temperature to which the air temperature can be reduced by vaporization of water. As connecting the apparatus of the invention to a turbocharged engine does not involve any changes in the cubic volume of the air intake system, it has no adverse effect on the power output of the engine, either.

Another advantage of the invention is that the humidity of the intake air can be increased stepwise after each heat supply point, thus adjusting the humidity of the gas fed into the cylinder and therefore the formation of nitrogen oxides within desired limits.

The cited references do not disclose the system according to the claims of the present application. Therefore, we are in an opinion that the claims of the present application are novel. We believe that a person skilled in the art seeking solutions to the problems mentioned in the application is given no suggestion from the documents that would direct towards the present invention.

Reconsideration and allowance are, therefore, requested.

Respectfully submitted,

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